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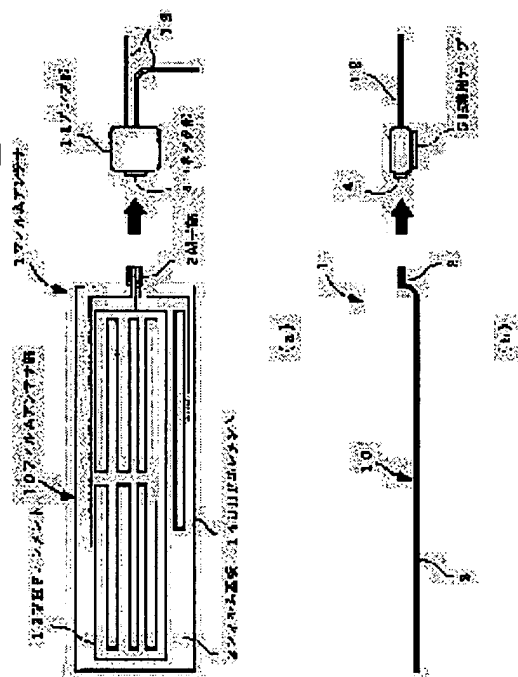
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(54) FILM ANTENNA

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a film antenna mounted with a simple work on a vehicle body.

SOLUTION: A film antenna section 10 consists of a thin synthetic resin film board 2, a loop VHF element 13 and a loop UHF element 14 are formed on the film board 2 through printing or vapor-deposition and a terminal section 3 projected as a edge is formed on the board 2. The UHF element 14 is connected to the terminal section 3. An earth wire introduced from the VHF element 13, a VHF signal wire capacitively coupled with the VHF element 13 and a UHF signal wire capacitively coupled with the UHF element 14 in total three wires are introduced to the terminal section 3, which is fitted to connector section 4 provided in an amplifier section 11.



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CLAIMS

[Claim(s)]

[Claim 1] The film antenna characterized by the film antenna section by which the electric supply section of this element is formed in the marginal part of the aforementioned film substrate while the element is formed on the film substrate, the amplifier section which builds in the amplifier while having the connector equipped with the aforementioned electric supply section of this film antenna section free [attachment and detachment], and the shell bird clapper.

[Claim 2] The film antenna characterized by starting and forming the aforementioned electric supply section from the aforementioned film substrate so that it may consist of the amplifier section which both builds in the amplifier as it is characterized by providing the following and the aforementioned film antenna section and the aforementioned amplifier section may be attached on the insulator of a plane The film antenna section by which the electric supply section of this element is formed in the marginal part of the aforementioned film substrate while the element is formed on the film substrate The connector equipped with the aforementioned electric supply section of this film antenna section free [attachment and detachment]

[Claim 3] The diversity antenna consists of the 1st aforementioned film antenna section of a couple and the 2nd aforementioned film antenna section which were made into the configuration of a bilateral symmetry. In the 1st aforementioned connector of the 1st aforementioned amplifier with which the 1st aforementioned film antenna section of this couple and the 2nd aforementioned film antenna section are equipped, respectively, and the 2nd aforementioned connector of the 2nd aforementioned amplifier The pin is made into the number of odd pins, and the pin of the center of the aforementioned pin is used as the pin for glands. One side of the pin made into the symmetrical position to the pin of the center of this is used as the pin for the aforementioned film antenna sections of the above 1st. The claim 1 characterized by using as the pin for the aforementioned film antenna sections of the above 2nd another side of the pin made into the symmetrical position to the pin of the center of the above, or a film antenna given in two.

[Claim 4] The claim 1 characterized by sticking an accessory plate on the aforementioned electric supply section, and forming thickly the portion with which the aforementioned connector in the aforementioned electric supply section is equipped, or a film antenna given in two.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the film antenna with which it is made suitable to attach in the glass of vehicles etc.

[0002]

[Description of the Prior Art] Conventionally, the antenna attached in a trunk lid or a roof is known as an antenna attached in vehicles. Let the roof antennas attached in a roof be being located in the place where an antenna is expensive, and an antenna suitable as an antenna for mount since a roof can be used as a ground plane. Moreover, the film antenna which can be attached in the posterior part glass of vehicles etc. as an antenna attached in vehicles is known.

[0003] Although the example of the conventional film antenna is shown in drawing 7 (a), this film antenna section 200 is equipped with VHF element 200a and UHF element 200b which were formed of printing etc. on the film substrate. The feeder 201 drawn from the amplifier section 202 is connected to this VHF element 200a and UHF element 200b, respectively. Moreover, from the amplifier section 202, the signal received by VHF element 200a and UHF element 200b is amplified, and it is outputted from the cable 204. Let a part of this cable 204 be the power cable supplied to the amplifier section 202. In addition, the feeder 201 is connected to the edge of VHF element 200a formed in the film antenna section 200, and UHF element 200b by soldering, welding, etc., respectively.

[0004]

[Problem(s) to be Solved by the Invention] The feeder 201 without an earth wire is connected to the edge of VHF element 200a and UHF element 200b in the conventional film antenna section 200 shown in drawing 7 (a). For this reason, it is necessary to connect the ground of the amplifier section 202 to a gland, and the amplifier section 202 removes the interior inside the body, and is directly attached in the body. Moreover, it is necessary to attach the film antenna section 200 on an insulator. Therefore, as shown in drawing 8, when the film antenna section 200 is attached in the posterior part glass 101 of an automobile 100, the amplifier section 202 is attached in the body which removed interior, and the ground of the amplifier section 202 is connected to the body. In addition, the feeder 201 without an earth wire has become a part of VHF element 200a and UHF element 200b. Therefore, while being unable to lengthen a feeder 201, there was a trouble that the body was made to meet and it could not wire.

[0005] Furthermore, when it connected with the edge of VHF element 200a or UHF element 200b beforehand and the end of a feeder 201 attached the amplifier section 202 in the body of an automobile 100, it introduced the other end of a feeder 201 in the amplifier section 202, and had connected. Thus, it was difficult for a general user to install the work which installs the antenna for mount which consists of the film antenna section 200 and the amplifier section 202 in an automobile 100, since sufficient knowledge about an antenna and an automobile is needed while prolonged work is needed.

[0006] Moreover, laying and supplying electric power to the film antenna section 200 in which the terminal box 210 was attached on the glass side as a feeder 201 was changed to connecting with direct VHF element 200a and UHF element 200b and was shown in drawing 7 (b) is also performed. In this case, as shown in drawing 7 (c), it is prepared in the rear face of a terminal box 210 so that two or more terminals 212 energized free [frequent appearance] may project, and alignment of this terminal 212 is carried out to the edge of VHF element 200a and UHF element 200b, and it is sticking on the film antenna section 200 in which the terminal box 210 was attached on the glass side. The double-sided tape is formed in the rear face of a terminal box 210, and it enables it to be stuck on the film antenna section 200 attached on the glass side as shown in drawing 7 (b).

[0007] If such a terminal box 210 is used, the workability for connecting will come to improve. However, as mentioned above, since the feeder 201 is operating as an antenna, if in charge of installing an antenna, sufficient knowledge about

an antenna and an automobile is needed. Furthermore, if the attachment force of the double-sided tape which is sticking the terminal box 210 deteriorates by secular change, since the terminal 212 is energized in the direction which secedes from an attachment side with a spring, a terminal box 210 will come to separate from an attachment side. Then, the trouble that a poor contact with a terminal 212, VHF element 200a, and UHF element 200b arises arises.

[0008] Then, it aims at offering the film antenna which the poor contact by secular change does not produce while it does not need special knowledge, in case this invention installs an antenna while being able to attach it in the body by easy work.

[0009]

[Means for Solving the Problem] In order to attain the aforementioned purpose, the film antenna of this invention consists of the amplifier sections which build in the amplifier while being equipped with the connector equipped with the film antenna section by which the electric supply section of this element is formed in the marginal part of the aforementioned film substrate while the element is formed on the film substrate, and the aforementioned electric supply section of this film antenna section free [attachment and detachment].

[0010] Moreover, other film antennas of this invention which can attain the aforementioned purpose The film antenna section by which the electric supply section of this element is formed in the marginal part of the aforementioned film substrate while the element is formed on the film substrate, While the aforementioned electric supply section of this film antenna section is equipped with the connector with which it is equipped free [attachment and detachment] It consists of the amplifier section which builds in the amplifier, and the aforementioned electric supply section may be started and formed from the aforementioned film substrate so that the aforementioned film antenna section and the aforementioned amplifier section may be attached on the insulator of a plane.

[0011] Furthermore, in the film antenna of the aforementioned this invention, it consists of the 1st aforementioned film antenna section of a couple and the 2nd aforementioned film antenna section by which the diversity antenna was made the configuration of a bilateral symmetry. In the 1st aforementioned connector of the 1st aforementioned amplifier with which the 1st aforementioned film antenna section of this couple and the 2nd aforementioned film antenna section are equipped, respectively, and the 2nd aforementioned connector of the 2nd aforementioned amplifier The pin is made into the number of odd pins, and the pin of the center of the aforementioned pin is used as the pin for glands. Let another side of the pin by which one side of the pin made into the symmetrical position to the pin of the center of this was used as the pin for the aforementioned film antenna sections of the above 1st, and was made into the symmetrical position to the pin of the center of the above be a pin for the aforementioned film antenna sections of the above 2nd. In the film antenna of the aforementioned this invention, an accessory plate may be stuck on the aforementioned electric supply section, and the portion with which the aforementioned connector in the aforementioned electric supply section is equipped may be formed thickly further again.

[0012] Since according to such this invention the electric supply section of the antenna element formed on the film substrate is prepared in the marginal part of the film antenna section and the connector of the amplifier section was equipped with this electric supply section, while being able to make easily connection between the film antenna section and the amplifier section, it is ceased to also produce the poor contact by secular change. Since the ground from the film antenna section is also introduced into the electric supply section, it becomes unnecessary moreover, to connect and carry out the gland of the ground of the amplifier section to the body. Therefore, it becomes possible to install, even if there is no knowledge about an antenna or an automobile, while being able to do the work which installs a film antenna in the body etc. in a short time, since the amplifier section can be fixed on insulators, such as a glass side.

[0013] Furthermore, if another side of a pin is used as the pin for the film antenna sections of another side while using as the pin for one film antenna sections one side of the pin which used the central pin as the pin for glands, and was made into the symmetrical position to the central pin in the pin of a connector, the amplifier of common composition can be equipped with one pair of film antenna sections made into the configuration of a bilateral symmetry. an accessory plate is stuck on the electric supply section, if the portion with which the connector in the electric supply section is equipped is made to become thick, even if the film substrate is made thin, a connector can be easily equipped with the electric supply section, installation can be boiled markedly and it can be simplified further again

[0014]

[Embodiments of the Invention] The example of composition of the gestalt of operation of the film antenna of this invention is shown in drawing 1 (a) and (b). However, drawing 1 (a) is a plan before the assembly of the film antenna of this invention, and this drawing (b) is the front view before the assembly of the film antenna of this invention. As shown in drawing 1 (a) and (b), the film antenna 1 of the gestalt of operation of this invention consists of the film antenna section 10 and the amplifier section 11. The film antenna section 10 consists of thin film substrates 2 made of synthetic resin, and the loop-like VHF element 13 and the loop-like UHF element 14 are formed of printing, vacuum evaporation, etc. on this film substrate 2. Moreover, the terminal area 3 which projects at the marginal part of the film

antenna section 10 is formed. This terminal area 3 is started so that the film substrate 2 may be illustrated, and it is formed in the position higher than the film substrate 2. Moreover, the accessory plate for thickening a terminal area 3 is stuck on the rear face of a terminal area 3.

[0015] Furthermore, three, the earth wire introduced from the VHF element 13 to which the UHF element 14 is connected, the VHF signal line which is carrying out capacity coupling to the VHF element 13, and the UHF signal line which is carrying out capacity coupling to the UHF element 14, are introduced into the terminal area 3. Wearing to the connector area 4 with which the amplifier section 11 was equipped of this terminal area 3 is enabled, and the earth wire introduced into the terminal area 3, a VHF signal line, and a UHF signal line come to be connected to the amplifying circuit built in the amplifier section 11 by inserting a terminal area 3 in a connector area 4, as an arrow shows. In this case, since an accessory plate is stuck on a terminal area 3 and it thickens, even if the film substrate 2 is made thin, it can insert in a connector area 4 certainly. Thereby, the VHF input signal and UHF input signal which were amplified come to be drawn from a cable 12. The cable 12 is led to the receiver which is not illustrated, and it supplies the power supply to the amplifier section 11, some cables 12 being used as a power supply line. Thus, from the film antenna section 10, since a VHF input signal or a UHF input signal is outputted by an earth wire and the signal line, it is not necessary to carry out the gland of the ground of the amplifier section 11.

[0016] It is stuck on the glass side of an automobile and fixes, and since it is not necessary to carry out the gland of the ground of the amplifier section 11 as mentioned above, the amplifier section 11 can also fix the film antenna section 10 by attachment to a glass side. In this case, it rises by bending the film substrate 2, and is made to form a terminal area 3 in a position higher than the film substrate 2 so that the inferior surface of tongue of the amplifier section 11 and the rear face of the film antenna section 10 can be installed in the same height. Moreover, adhesives are applied to the rear face of the film antenna section 10, and the film antenna section 10 can be stuck on a glass side by laying the film antenna section 10 which removed the protection sheet in the glass side on which water was sprayed. Furthermore, the attachment tapes 5, such as a double-sided tape, are formed in the rear face of the amplifier section 11, after equipping a connector area 4 with a terminal area 3, the protection sheet of the tape 5 for attachment is removed, and the amplifier section 11 is stuck on the predetermined position of a glass side.

[0017] Next, the detail of the connection composition of the terminal area 3 of the film antenna section 10 and the connector area 4 of the amplifier section 11 is explained with reference to drawing 2 and drawing 3 (a). However, drawing 2 is in the state before connecting the terminal area 3 of the film antenna section 10, and the connector area 4 of the amplifier section 11, and drawing 3 (a) is in the state after connecting the terminal area 3 of the film antenna section 10, and the connector area 4 of the amplifier section 11. The terminal area 3 is started and constituted by being bent in the shape of L character from the film substrate 2 as shown in these drawings. Let the height of this starting be the height of a connector area 4. Moreover, since the film substrate 2 is formed thinly, it is not made into thickness with the sufficient thickness of a terminal area 3 to equip a connector area 4. Then, it is considering as sufficient thickness to stick an accessory plate 15 on the rear face of a terminal area 3, and equip a connector area 4. Moreover, a connector area 4 consists of existing connectors, and let the number of pins be for example, nine pins.

[0018] It considers as nine pins for the distance between pins approaching too much in the existing connector, and when considering as sufficient pin interval, just let them be at least 3 pins. Moreover, when you apply the film antenna 1 of this invention to a diversity antenna so that it may mention later, just let the connector area 4 be the number of pins of at least 5 pins. The pin allocation at the time of using a connector area 4 as nine pins is shown in drawing 3 (b). As shown in drawing 3 (b), let 5 No. pin #5 of a center be a pin for glands among nine pins in a connector area 4. The earth wire (G) in the terminal area of the film antenna section 10 is connected to these 5 No. pin #5. Moreover, the VHF signal line in the terminal area 3 of the film antenna section 10 is connected to 1 No. pin #1. Furthermore, the UHF signal line in the terminal area 3 of the film antenna section 10 is connected to 7 No. pin #7. The VHF signal line in the film antenna considered as the composition of the film antenna section 10 and a bilateral symmetry is connected to 9 No. pin #9 further again. Furthermore, the UHF signal line in the film antenna considered as the composition of the film antenna section 10 and a bilateral symmetry is connected to 3 No. pin #3. Thus, pin allocation is carried out so that a VHF signal line may be connected to pin #1 of a symmetric position, and #9 focusing on 5 No. pin #5 and a UHF signal line may be connected to pin #3 of a symmetric position, and #7 focusing on 5 No. pin #5. About this reason, it mentions later.

[0019] By the way, directivity comes to be disturbed by the influence of an automobile when the film antenna 1 shown in drawing 1 is installed in an automobile while it did not have the perfect indirectivity in the level surface. Consequently, the received-power intensity by the film antenna 1 comes to change during movement. Diversity reception is known as a method of solving this. Although there are some methods in diversity reception, the space diversity using two antennas is the method of being isolated spatially, arranging two antennas, choosing the larger one of the received power of the two antennas, and receiving. The composition at the time of applying the film antenna 1 of this invention to such diversity reception is shown in drawing 4.

[0020] The diversity antenna 50 is constituted by 1st film antenna 1a and 2nd film antenna 1b in drawing 4 . 1st film antenna 1a and 2nd film antenna 1b are made into the configuration of a bilateral symmetry, and composition of 1st film antenna 1a and 2nd film antenna 1b is made to be the same as that of the film antenna 1 shown in drawing 1 . Such a diversity antenna 50 can be installed in an automobile 100, as shown in drawing 5 . In drawing 5 , 1st film antenna 1a is installed in the left-hand side of the posterior part glass 101 of an automobile 100, and 2nd film antenna 1b is installed in the right-hand side of the posterior part glass 101 of an automobile 100. Although 1st film antenna 1a and 2nd film antenna 1b are stuck on the glass side by the side of the vehicle interior of a room of posterior part glass 101, since the film antenna sections 10a and 10b are made almost transparent, they do not bar a back field of view. And diversity reception mentioned above can be performed by connecting to a diversity receiver cable 12a and cable 12b which were drawn from amplifier section 11a and amplifier section 11b.

[0021] In addition, as shown in drawing 5 , it faces installing the diversity antenna 50 in an automobile 100, and since 1st film antenna 1a and 2nd film antenna 1b are used as the antenna of a bilateral symmetry, arrangement of the earth wire in the terminal area, a VHF signal line, and a UHF signal line also serves as a bilateral symmetry. Therefore, it is necessary to also assign pin allocation of the connector area in amplifier section 11a and amplifier section 11b according to it. That is, while combining amplifier section 11a with 1st film antenna 1a, amplifier section 11b must be combined with 2nd film antenna 1b. When it was such a combination and combines by mistake, the diversity antenna 50 will not carry out desired operation.

[0022] Then, it can be good also considering the combination of 1st film antenna 1a and 2nd film antenna 1b, and amplifier section 11a and amplifier section 11b as which combination by performing pin allocation, as shown in aforementioned drawing 3 (b). That is, as shown in drawing 3 (b), when the amplifier section 11 equipped with the connector area 4 by which pin assignment was carried out is equipped with the terminal area of 1st film antenna 1a, the VHF signal line (L-V) of VHF element 13a in 1st film antenna 1a arranged on left-hand side to 1 No. pin #1 shown in drawing 3 (b) is connected. Furthermore, the UHF signal line (L-U) of UHF element 14a in 1st film antenna 1a arranged on left-hand side to 7 No. pin #7 is connected, and the earth wire (G) of 1st film antenna section 10a is connected to 5 No. pin #5.

[0023] Moreover, as shown in drawing 3 (b), when it equips with the terminal area of 2nd film antenna 1b considered as the composition of 1st film antenna 1a and a bilateral symmetry at the amplifier section 11 equipped with the connector area 4 by which pin assignment was carried out, the VHF signal line (R-V) of VHF element 13b in 2nd film antenna 1b arranged on right-hand side to 9 No. pin #9 shown in drawing 3 (b) is connected. Furthermore, the UHF signal line (R-U) of UHF element 14b in 2nd film antenna 1b arranged on right-hand side to 3 No. pin #3 is connected, and the earth wire (G) of 2nd film antenna section 10b is connected to 5 No. pin #5. If it is such pin allocation, amplifier section 11a and amplifier section 11b can be considered as the same composition. For this reason, let 1st film antenna 1a and 2nd film antenna 1b, and amplifier section 11a and amplifier section 11b that were considered as common composition be the diversity antennas 50 which operate the request also as which combination. thereby, installation of the diversity antenna 50 can be boiled markedly and let it be a simple thing

[0024] If the composition of 1st film antenna 1a in the diversity antenna shown in drawing 3 and 2nd film antenna 1b is referred to, in the terminal area in each 1st film antenna 1a and 2nd film antenna 1b, the VHF input signal or the UHF input signal is drawn by the earth wire, the VHF signal line, or the UHF signal line. That is, the not a feeder but usual feeder which operates as an antenna come to be connected to this terminal area. For this reason, while being able to make the length of a feeder into arbitrary length, when it is made into a coaxial cable, it becomes possible [also arranging a feeder along with the body which is a metal body]. The film antenna 1 or the diversity antenna 50 concerning this invention can be installed also in the rear glass in the hatchback-type automobile impossible thereby conventionally.

[0025] The composition which installed the diversity antenna 50 shown in the hatchback-type automobile 110 at drawing 4 concerning this invention in drawing 6 is shown. In drawing 6 , 1st film antenna 1a is installed in the left-hand side of the rear glass 102 of an automobile 110, and 2nd film antenna 1b is installed in the right-hand side of the rear glass 102 of an automobile 110. Although 1st film antenna 1a and 2nd film antenna 1b are stuck on the glass side by the side of the vehicle interior of a room of a rear glass 102, since film antenna section 10a and film antenna section 10b are made almost transparent, they do not bar a back field of view. And along with rear glass 102, draw the cables 12a and 12b drawn from amplifier section 11a and amplifier section 11b, and it is made to meet the inside of the body, and extends to a diversity receiver. Diversity reception which looked like [this] and was mentioned more above by the diversity receiver can be performed now. In addition, with a film antenna as shown in conventional drawing 7 , since a feeder 201 operates as an antenna, the length cannot be lengthened. Furthermore, it cannot install on a glass side from the need of carrying out the gland also of the amplifier section 202 to the body. Therefore, the conventional film antenna was not able to be installed in the rear glass 102 in the door of the hatchback formula whose opening and closing were

enabled.

[0026] Let the VHF element 13 and the UHF element 14 be loop antennas in the film antenna of this invention explained above. And each input signal is drawn by carrying out capacity coupling to the VHF element 13 and the UHF element 14 which were used as this loop antenna. Thus, an inductive component can be adjusted by the KYAPASHITIBU component of capacity coupling by considering as the composition which derives an input signal by capacity coupling from the VHF element 13 made inductive and the UHF element 14. It becomes possible to make the film antenna section 10 and the amplifier section 11 match, without this needing a matching circuit. Moreover, if the number of pins of the connector area 4 in the amplifier section 11 is odd more than the number which added one which is the number of earth wires to the double precision of not only the number of pins but the number of elements which ***** (ed), let them be arbitrary numbers.

[0027]

[Effect of the Invention] Since the electric supply section of the antenna element formed on the film substrate is prepared in the marginal part of the film antenna section and the connector of the amplifier section was equipped with this electric supply section, as this invention was explained above, while being able to make easily connection between the film antenna section and the amplifier section, it is ceased to also produce the poor contact by secular change. Since the ground from the film antenna section is also introduced into the electric supply section, it becomes unnecessary moreover, to connect and carry out the gland of the ground of the amplifier section to the body. Therefore, it becomes possible to install, even if there is no knowledge about an antenna or an automobile, while being able to do the work which installs a film antenna in the body etc. in a short time, since the amplifier section can be fixed on insulators, such as a glass side.

[0028] Furthermore, while using as the pin for one film antenna sections one side of the pin which used the central pin as the pin for glands, and was made into the symmetrical position to the central pin in the pin of a connector if another side of a pin is used as the pin for the film antenna sections of another side, the amplifier of common composition can be equipped with one pair of film antenna sections made into the configuration of a bilateral symmetry, installation can be boiled markedly and it can be simplified. An accessory plate is stuck on the electric supply section, and if the portion with which the connector in the electric supply section is equipped is made to become thick, even if the film substrate is made thin, a connector can be easily equipped with the electric supply section further again.

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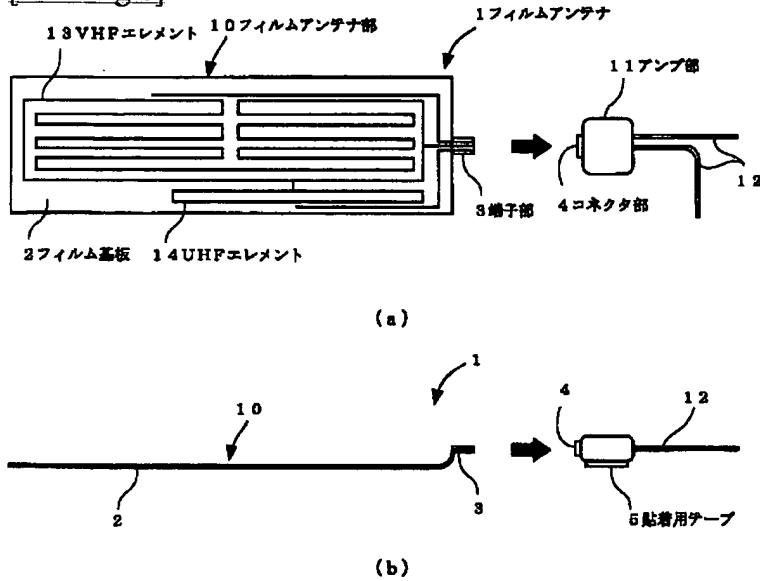
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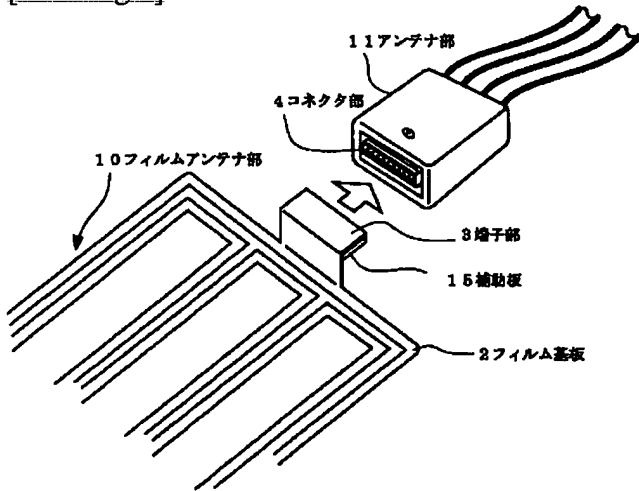
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DRAWINGS

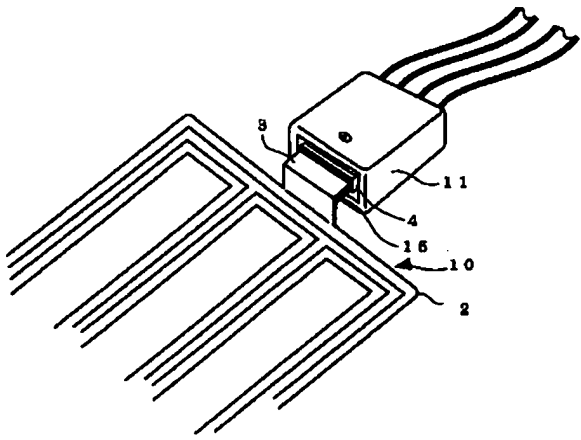
[Drawing 1]



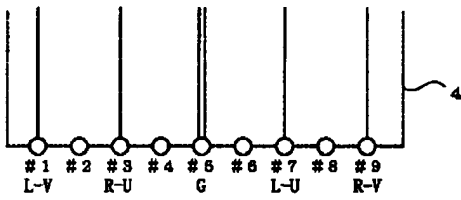
[Drawing 2]



[Drawing 3]

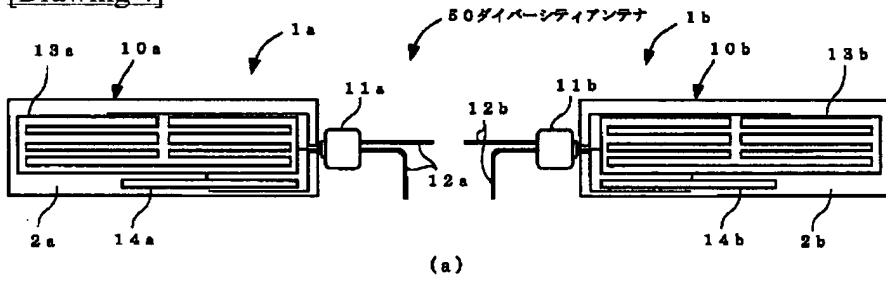


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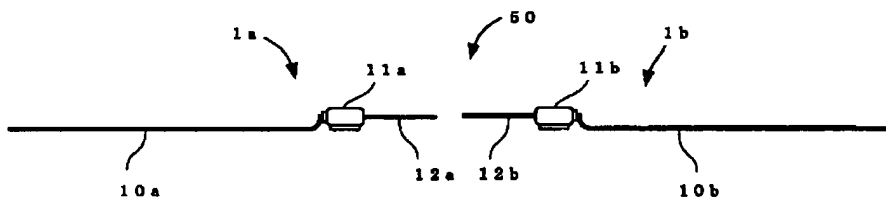


(b)

[Drawing 4]

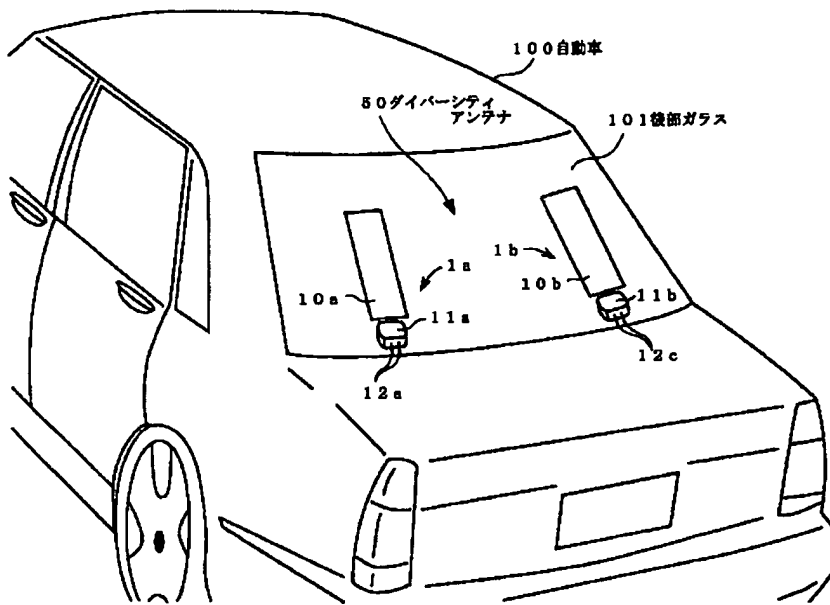


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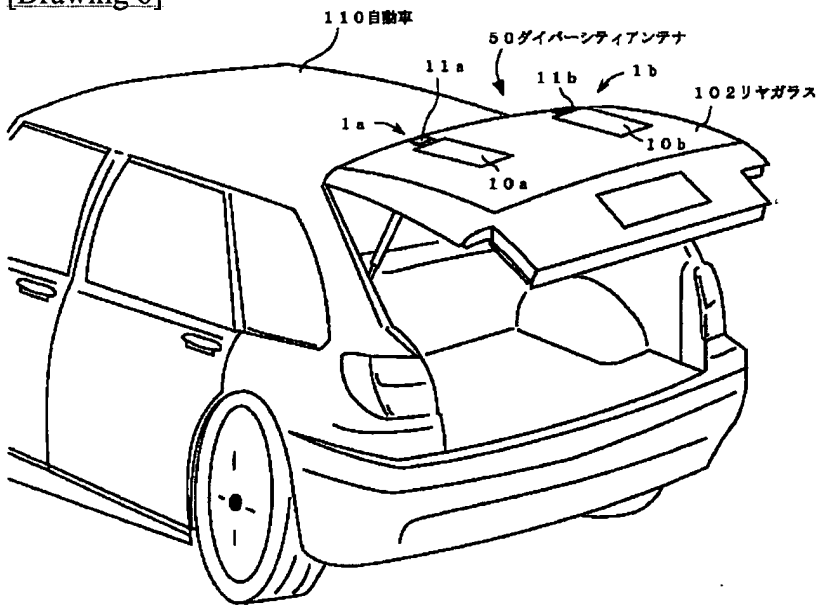


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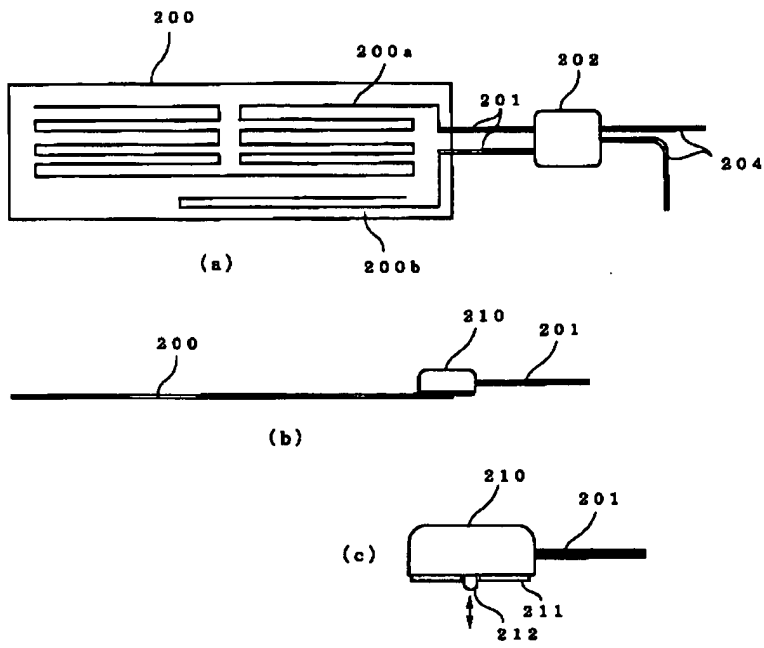
[Drawing 5]



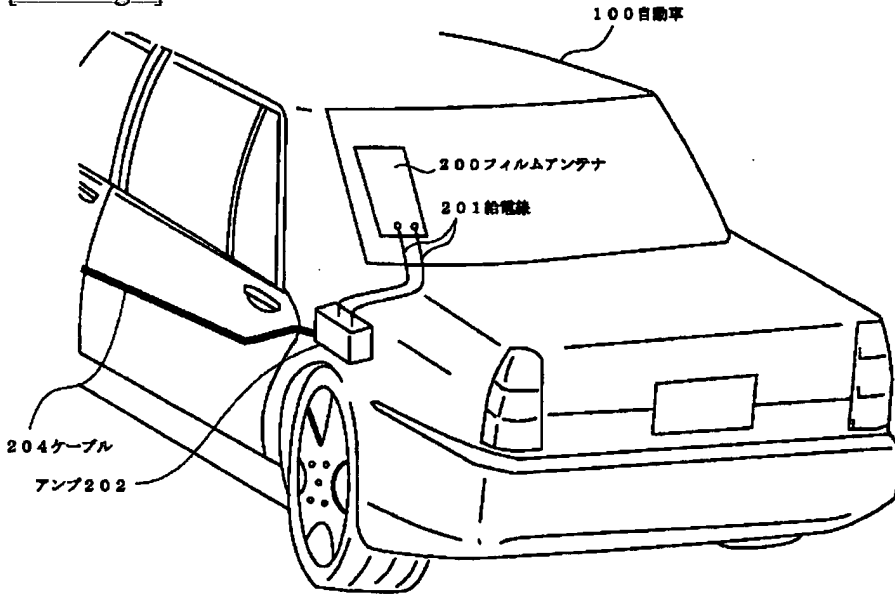
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]